REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 2 and 3 are requested to be canceled.

Claims 1, 4, 5, and 8-10 are currently being amended.

No claims are being added.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1 and 4-16 are now pending in this application.

Amendment to the Claims

Claim 1 has been amended to include the limitation "α [deg] represents a difference of θ and an inclination value measured at a point farthest from θ." Support for this amendment can be found at least at page 16, lines 25-29; page 18, lines 18-22; and page 21, lines 6-10 of the specification.

Claims 8-10 have been amended to correct minor grammatical errors and no change in their scope was intended.

Basis of the Invention

The basis of the invention, as defined in the amended claim 1, includes GaN crystals that are hetero-epitaxially grown on a hetero-substrate, as illustrated in Fig. 1 below. Initially, a number of crystal nuclei (grains) are generated on the substrate and they are then gradually combined with each other to have a nearly flat surface. (see also page 4, line 28 to page 5, line 4 of the specification). However, tilting or twisting of the grains will likely cause the occurrence of regions where the crystal axes of the grains are individually inclined, as illustrated in Fig. 2 below. (see also page 5, lines 8-17 of the specification).
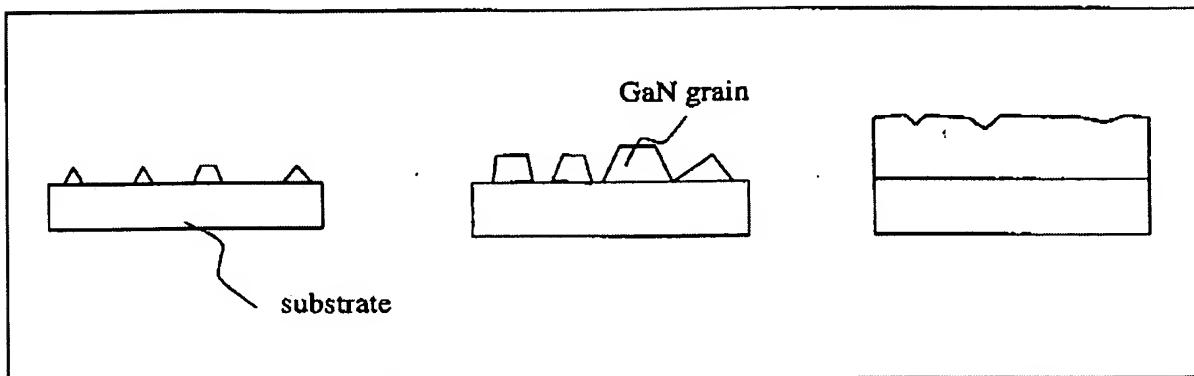
FIG. 1
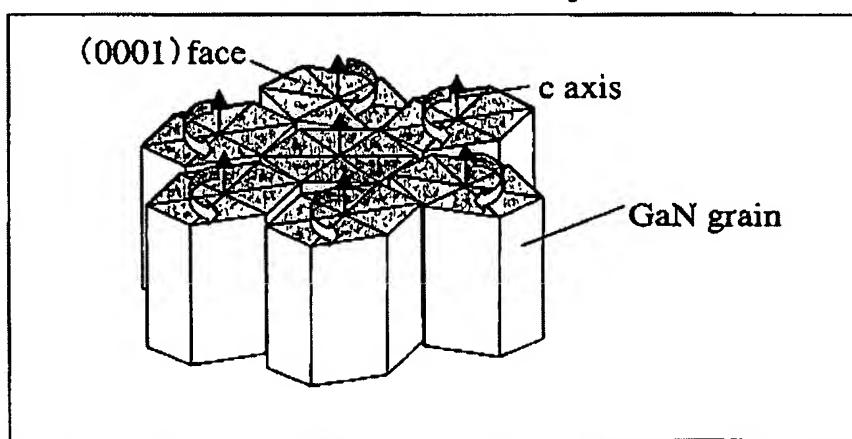
Fig. 2

Because the inclination of the crystal axis in each grain is generated inside of the crystal structure, it cannot be eliminated even when the surface of the crystal (the GaN substrate) is polished to be mirror flat, as illustrated in Fig. 3 below. Thus, regardless of the polishing, the roughness in the surface morphology will occur due to the underlying grains with the crystal axis individually inclined in various directions when a GaN layer is epitaxially grown on the polished surface of the GaN substrate. (see page 8, lines 16-19 of the specification).
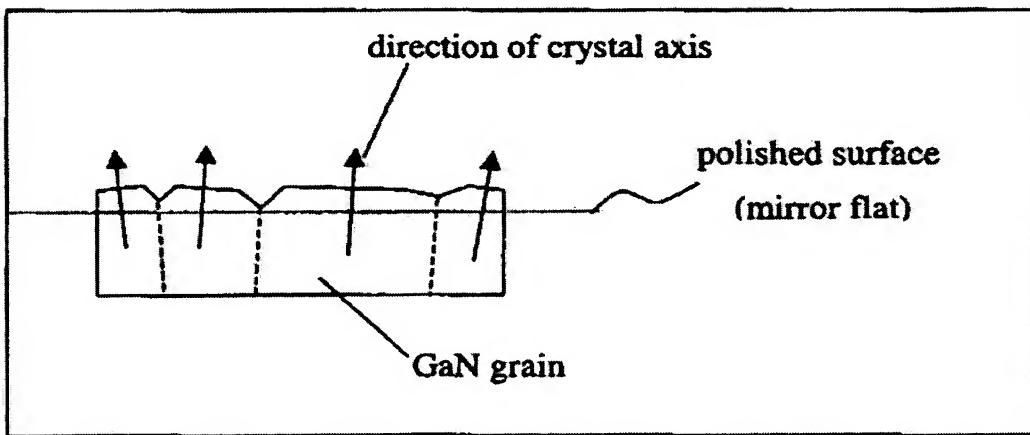
Fig. 3

To solve this problem, the invention is defined to have a limitation of "$\theta > \alpha$," where θ [deg] is given as the average in angles of the substrate surface to low index surfaces closest to the substrate surface measured at a plurality of arbitrary points in plane of the substrate, and α [deg] represents the difference of θ and an inclination value measured at a point farthest from θ.

By virtue of the limitation "$\theta > \alpha$," the present invention prevents the roughness in the surface morphology in the GaN layer grown on the substrate.

Rejection of claims 1-16 under 35 USC 102 in view of Motoki

The PTO has rejected claims 1-16 as being anticipated by U.S. Patent Application Publication 2002/0028564A1 to Motoki. This rejection is traverse for the following reasons.

Motoki teaches an ingot or substrate with a mirror flat surface but fails to mention the feature "$\theta > \alpha$," as defined in the amended claim 1. Even though Motoki's substrate has a mirror flat surface, the crystal axis in each grain will remain individually inclined in various directions inside of the substrate. As a result, the GaN layer grown on the substrate will have roughness in the surface morphology. In contrast, the invention of the present application prevents roughness in the surface morphology in the GaN layer grown on the substrate by means of the feature "$\theta > \alpha$." Thus, the invention defined in the amended claim 1 and its dependent claims 4-16 is not anticipated by Motoki.

In regard to the relationship "$\theta > \alpha$," the PTO has stated that "this is a normal statistical result, that a measurement is greater than its variance." (see page 2, paragraph 2. of

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the Office Action dated July 25, 2005). However, the relationship "$\theta > \alpha$" is not a normal statistical result since α is further defined as "a difference of θ and an inclination value measured at a point farthest from θ," as amended in claim 1. Thus, the relationship "$\theta > \alpha$" is not an inevitable statistical result.

Reconsideration and withdrawal of this rejection are respectfully traversed.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,
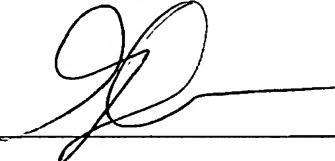
Date ___October 25, 2005_____   By _____

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